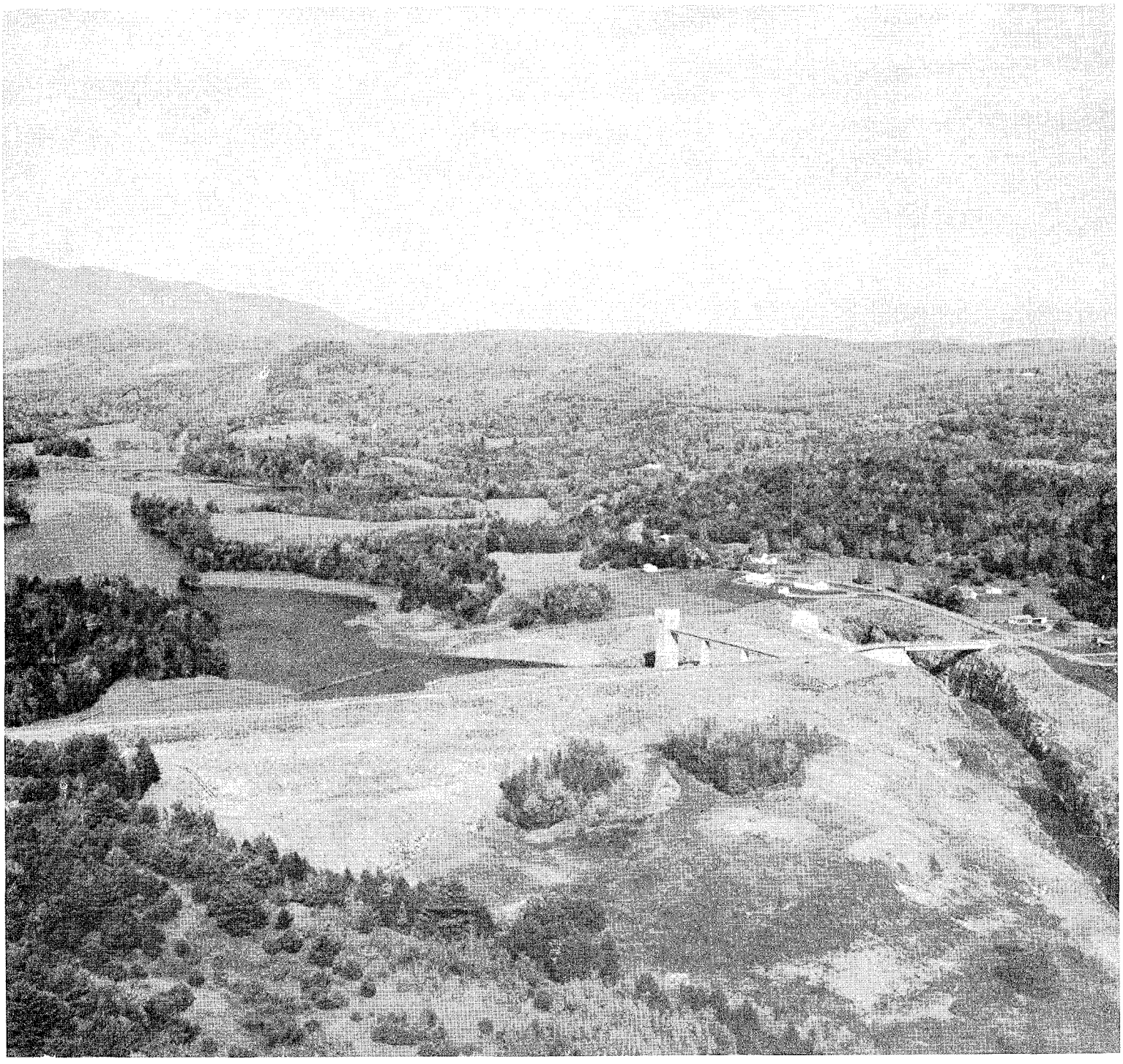
US Army Corps
of Engineers
New England Division

MARCH 1985

Drought Contingency Storage Plan

North Springfield Lake, North Springfield, Vermont



CONNECTICUT RIVER BASIN
BLACK RIVER WATERSHED

DROUGHT CONTINGENCY STORAGE PLAN
NORTH SPRINGFIELD LAKE
NORTH SPRINGFIELD,VERMONT

MARCH 1985

NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254-9149

SYLLABUS

A drought contingency storage plan was studied for North Springfield Lake in an effort to be responsive to public needs during drought situations. It was determined that water could be temporarily stored to an elevation of 470 feet NGVD, 3 feet above the permanent pool, providing up to approximately 1,060 acre-feet (345 million gallons) of reservoir storage for drought emergency purposes.

An evaluation of the potential effect of this plan has revealed no major adverse impacts at this time. The water quality at North Springfield is good and is suitable for public water supply with standard treatment processes.

DROUGHT CONTINGENCY PLAN
NORTH SPRINGFIELD LAKE

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NORTH SPRINGFIELD LAKE

1. PURPOSE AND SCOPE

The purpose of this study and report was to develop and set forth a drought contingency storage plan of operation for North Springfield Lake that would be responsive to public needs during drought periods and identify possible modifications to project regulation within current administrative and legislative constraints. This plan was based on preliminary studies utilizing readily available information. Included are a description of existing water supply conditions, the potential for reallocation of reservoir storage within specified limits, an evaluation of water quality, a discussion of impacts on other project purposes, the effects on the environment, and a summary and conclusion.

2. AUTHORIZATION

The authority for the preparation of drought contingency plans is contained in ER 1110-2-1941 which provides that water control managers will continually review and, when appropriate, adjust water control plans in response to changing public needs. Drought contingency plans will be developed on a regional, basin-wide and project basis as an integral part of water control management activities.

3. PROJECT AUTHORIZATION CONDITIONS

North Springfield Lake was authorized by the Flood Control Act of 1938, Public Law 761, as a single purpose flood control reservoir. However, Section 4 of the Flood Control Act of 22 December 1944 as amended, provided for the development and use of reservoir areas for public recreational purposes.

4. PROJECT DESCRIPTION

North Springfield Lake, completed in 1960, is a dual purpose flood control and recreation project, located on the Black River in North Springfield, VT, approximately 8.5 miles upstream of the confluence of the Black and

Connecticut Rivers and 3 miles northwest of Springfield, VT. A map of the Connecticut River basin is shown on plate 1.

The project contains storage for flood control and recreation. Two recreational areas have been established at the North Springfield project. The first is a 15-foot deep recreation pool on the Black River (elevation 467 feet NGVD), containing 500 acre-feet equal to 0.06 inch of runoff. The second, located on the North Branch, is a 20-foot deep permanent recreation pool (elevation 502 feet NGVD) impounded by the Town Road 22 embankment, with a storage of approximately 600 acre-feet equivalent to 0.07 inch of runoff. The flood control storage contains 50,000 acre-feet which equals 5.93 inches of runoff from the 158 square mile drainage area. A capacity table is shown on plate 2.

The physical components of the North Springfield Lake project consist of a rolled earthfill dam with rock slope protection, side channel spillway, outlet works, relocated town road 22 embankment, facilities for recreational purposes and storage for both flood control and recreation. The outlet works consist of an approach channel, intake structure, discharge conduit and discharge channel. A U-shaped concrete weir just upstream of the center gate maintains the 15-foot permanent recreation pool. The concrete intake structure houses the necessary equipment to operate three 5 foot wide x 12 foot high slide gates with hydraulic hoists. These gates regulate discharge through the 12.75-foot diameter, 659 foot long horseshoe conduit. A summary of pertinent data at North Springfield Lake is listed on plate 3.

5. PRESENT OPERATING REGULATIONS

a. Normal Periods. The recreation pool is approximately 15 feet deep and is maintained by a concrete weir upstream of gate 2. The gate settings are at 0′-6′-0′.

b. Flood Periods. North Springfield is operated in concert with other projects in the basin to reduce downstream flooding in the Connecticut River basin. Operations for floods may be considered in three phases: phase I - appraisal of storm and river conditions during development of a flood, phase II - flow regulation and storage of flood runoff at the reservoir, and phase III - emptying the reservoir during recession of the flood. The regulation procedures are detailed in the Master Water Control Manual for the Connecticut River basin.

c. Regulating Constraints

(1) Minimum Releases. A minimum release of approximately 15 cfs is maintained during periods of flood regulation in order to sustain downstream fish life.

(2) Maximum Releases. The maximum nondamaging discharge immediately downstream of North Springfield Lake is about 3,500 cfs.

6. MONITORING OF HYDROLOGIC CONDITIONS

The Reservoir Control Center directs the reservoir regulation activities at 28 New England Division flood control dams, and continually monitors rainfall, snow cover and runoff conditions throughout the region. When any of these hydrologic parameters have been well below normal for several months and it appears that possible drought conditions might develop, the Corps Emergency Operations Center (EOC) will be so informed. The EOC will then initiate discussions with the respective Federal and State agencies and other in-house Corps elements to review possible drought concerns and future Corps actions.

7. DESCRIPTION OF EXISTING WATER SUPPLY CONDITIONS

a. General. The area of concern is the eastern portion of central Vermont encompassing a large part of Windham and Windsor Counties. Table 1 contains information about public water supply systems in the area based on information provided by the Vermont Department of Health , Division Of Environmental Health. Of the ten communities in the study area, two are at least partially supplied by municipally-owned and operated public water supply systems. Parts of five communities are partially supplied by privately-owned and operated water supply systems. Included in table 1 are only those privately-owned systems with greater than 20 service connections and a maximum daily demand of at least 0.01 mgd. An exception was made in one instance, Vermont Academy in Rockingham, where there are less than 20 service connections and demand far exceeded the 0.01 mgd maximum daily demand cutoff.

b. Water Supply Systems. The primary objective of this analysis was to accumulate available data regarding water supply systems in the vicinity of North Springfield Lake that could benefit from storage at the project, and to present the data in a manner portraying existing water

TABLE 1
MAJOR WATER SUPPLIERS - EASTERN CENTRAL VERMONT

Company or Agency	Ownership	Town Served	Service Connections	Source of Supply GW/SW	1981 Demand Avg. Day (MGD)	1981 Demand Max. Day (MGD)	Supply Source	Safe Yield (MGD)
Brattleboro Water Dept.	Municipal	Brattleboro	2,450	GW/SW	2.606	3.612	Pleasant Valley Res. Retreat Meadows - Gravel Well	1.200 0.800
Glenn Run Condos	Private	Dover	34	GW	0.008	0.016	Rock Well	0.043
Dover Green Condos	Private	Dover	48	GW	0.014	-	Rock Well	-
Mt. Snow Vilage Water Assoc.	Cooperative	Dover	42	GW	0.010	0.020	Rock Well	0.032
Snowtree Condos	Private	Dover	69	GW	0.013	0.027	Rock Well	-
Suntec Forest Condos	Private	Dover	50	GW	0.023	0.045	Rock Well	0.031
Magic Village Coop.	Cooperative	Londonderry	52	GW	0.016	0.031	Rock Well #1 Rock Well #2 Rock Well #3	- 0.006 0.007
Rolling Meadows Water System	Cooperative	Newfane	20	GW	0.006	0.012	Rock Well	0.058
Germon Trailer Park	Private	Putney	27	GW	0.005	0.010	Rock Well	0.036
Bellows Falls Water Dept.	Municipal	Rockingham	1,000	SW	0.600	1.200	Minards Pond Ellis Brook Farr Brook	2.600 2.500 0.155
North Shore Trailer Park	Private	Rockingham	22	GW	0.006	0.011	Well Point	0.017
Vermont Academy	Private	Rockingham	18	SW/GW	0.020	0.040	Brook Impoundment (Emergency) Rock Well	0.020 0.050
Timbercreek Condos	Cooperative	West Dover	72	-	-	-	-	-
N. Westminster Water	Cooperative	Westminster	26	GW	0.008	0.015	Spring #1 Spring #2 (Standby) Rock Well #1 (Standby) Rock Well #2	0.013 0.036 - -
Shady Pines Mobile Home Park	Private	Westminster	20	GW	0.005	0.010	Gravel Well	-
Westminster Aquaduct SOC	Cooperative	Westminster	70	GW	0.0	0.042	Spring	0.050

supply conditions. Projections of future demands were not developed because this study addresses only modifications in the operational procedures at North Springfield Lake in order to provide storage for water supply purposes when drought conditions exist, and not to meet normal water supply demands at some future date.

c. Eastern Central Vermont Water Supply. As noted in table 1, the data given for each water supplier includes: type of ownership, community served, service connections served by the system, source of supply (ground or surface water), average daily and maximum daily demands for 1981, estimated safe yield of the source, and any further information available on the source of supply. An analysis of the adequacy of existing sources during drought conditions has not been performed. The information has been accumulated to present a summary of the existing water supply conditions for the eastern-central Vermont area.

d. Population Projections. Population projections for communities in the study area are given in table 2 to show population trends for each community potentially affected by a prolonged dry period. The projections were provided by the Vermont State Planning Office. The high series of population projections, assuming migration rates through the year 2000 will continue at the rate observed from 1970-1980, are included in this report.

8. POTENTIAL FOR WATER SUPPLY REALLOCATION

a. General. There are several authorities that provide for the use of reservoir storage for water supply at Corps of Engineers projects. They vary from the provision of water supply storage as a major purpose in new projects to the discretionary authority to provide emergency supplies to local communities in need. In addition, guidance contained in ER 1110-2-1941 directs field offices to determine the short-term water supply capability of existing Corps reservoirs that would be functional under existing authorities. Congressional authorization is not required to add municipal and industrial water supply if the related revisions in regulation would not significantly affect operation of the project for the originally authorized purposes.

b. Drought Contingency Storage. It has been determined that a portion of the existing storage at North Springfield could be utilized for emergency drought storage without having an adverse impact on the project's flood control or recreation function. Storage could be

TABLE 2

POPULATION PROJECTIONS - EASTERN CENTRAL VERMONT

Town	Actual 1980	1985	1990	1995	2000	Percent Change 1980-2000
Andover	350	384	419	448	472	34.9
Cavendish	1,355	1,401	1,448	1,504	1,551	14.5
Chester	2,791	2,934	3,080	3,225	3,344	19.8
Grafton	604	656	717	769	814	34.8
Londonderry	1,510	1,669	1,869	2,028	2,163	43.3
Ludlow	2,414	2,460	2,507	2,588	2,655	10.0
Rockingham	5,538	5,821	6,043	6,353	6,616	19.5
Springfield	10,190	10,440	10,692	11,067	11,369	11.6
Wethersfield	2,534	2,691	2,852	3,000	3,122	23.2
Windham	223	242	263	282	298	33.6
TOTAL	27,509	28,698	28,890	31,264	32,404	18.9

made available to a pool elevation of approximately 470 feet NGVD (18-foot stage). This represents a volume of about 1,060 acre-feet, equivalent to 345 mg or approximately 2 percent of the reservoir storage. This volume is comprised of 500 acre-feet of permanent storage and 560 acre-feet of flood control storage. The 560 acre-feet represent an infringement of about 0.06 inch of runoff on the flood control storage.

Based on an all-season low flow duration analysis using 52 years of flow records for the gaging station below North Springfield Lake on the Black River, it was determined that during a 10-year frequency drought, the volume of runoff could: (a) fill the reservoir from elevation 467 to 470 feet NGVD in a 9-day summer period provided no releases were made from the dam or, (b) fill the reservoir to elevation 470 in a 33-day period if a continuing release of approximately 16 cfs (0.1 cfs/sq. mi.) were maintained. However, the reservoir could be filled to elevation 470 in about a 5-day period in May while continuously releasing 15 cfs. The stored water could be used for municipal supply with proper treatment, either by drawing directly from the reservoir or releasing for downstream withdrawal. Drought contingency storage versus flow duration at North Springfield Lake is shown graphically on plate 4.

c. Effects of Regulated Flows. The curtailment of flows from North Springfield Lake during the drought emergency could adversely impact on the flowage rights of downstream riparian users. At this time, however, it is not possible to review all of the various drought emergency situations that could occur, nor is it within the scope of this report to identify all those with water rights. It is important to note that when a specific drought emergency does occur, the legal implications would have to be weighed.

9. WATER QUALITY EVALUATION

a. Water Quality Classification

North Springfield Lake and Stoughton Pond are rated class B by the Vermont Water Resources Board. The Black River below North Springfield Dam is designated class C. The North Springfield Reservoir is a warm water fish habitat.

Class B waters are managed to achieve consistently good aesthetic value, to preserve a high level of quality for public water supply, irrigation and other agricul-

tural uses, swimming and recreation, and to sustain high quality habitat for aquatic biota, fish and wildlife. Technical requirements for class B include pH values maintained within the range of 6.5 to 8.0 SU, turbidity not to exceed 25 NTU, fecal coliform not to exceed 200 organisms/100 ml and color not to exceed 25 standard units. Dissolved oxygen should not drop below 5 mg/l or 60 percent saturation at any time.

Class C waters are managed to attain a water quality suitable for recreational water uses in which contact with the water is minimal and where ingestion of the water is not probable, i.e., boating, and to maintain habitat suitable for aquatic biota, fish and wildlife. Technical requirements for class C are basically the same as those for class B at this project.

b. Existing Water Quality

The water quality at North Springfield is generally good, usually meeting or exceeding the class B requirements for Vermont. Water quality measurements indicating good conditions are high levels of DO and low levels of coliform bacteria, turbidity, dissolved solids, heavy metals, and color.

While North Springfield's water quality is good, certain measurements indicate some treatment will be required for water supply usage. For instance, acid precipitation and natural soil conditions contribute to low pH levels which occasionally violate state criteria. In a public water supply low pH levels are not a health problem but may cause corrosion problems.

In addition, this impoundment experiences a high rate of bank erosion due to soil slumping which causes turbidity. Slumps can occur during filling, impoundment, or drawdown. Reservoir stage, however, has no bearing directly on the timing of the occurrence of slumps as the governing factor is soil moisture content. Undesirable in a public water supply, turbidity in water is unappealing to water customers. Also, the filtration of water becomes more difficult and costly when turbidity increases. The natural settling out of particles in the lake reduces turbidity levels downstream.

North Springfield is a borderline oligotrophic-mesotrophic impoundment with a hydraulic residence time of 1 to 4 days under normal summer flow conditions. Under minimum flow conditions, the hydraulic residence time increases to 1 to 2 weeks. Low nutrient levels and

short hydraulic detention time (the lake volume divided by the outflow) indicate this lake should be well protected from algal blooms. Temperatures in the lake are frequently higher than the optimum (68 F.) to support a good cold water fishery but rarely exceed the 85 F. maximum to support a warm water fishery.

c. Water Quality Requirements for Drought Storage. There are two requirements to be met. The waters must meet state standards for surface waters and must be of a quality appropriate for the water supply user. A water which meets class B standards in Vermont is usable for public water supply with standard treatment processes. The water quality required for industrial water supply depends on the industrial process involved. The water at North Springfield Lake would always be of a quality suitable for fire-fighting or irrigation.

d. Effects of Drought Storage. Increasing the size of the impoundment at North Springfield Lake for drought storage will not affect existing water quality in the pool significantly. With the proposed depth increase of 3 feet, an additional 71 acres of land would be flooded. The decay of organic material on the land may increase the extent and duration of anaerobic conditions in the lake. Present hydraulic residence time during normal summer flow conditions would increase from 1 to 4 days to 3 to 8 days and under minimum flows would increase from 1 to 2 weeks to 2 to 5 weeks. A larger surface area and longer hydraulic residence time may cause slightly in-increased temperatures in the pool. However, the trophic status of the lake is not likely to change and water quality for recreation and fishing will not deteriorate.

Raising the pool 3 feet could possibly increase occurences of soil slumping. Consequently, turbidity levels may rise. The death of vegetation in the newly inundated areas would loosen the soil and cause increased erosion in these areas. Most of the eroded soil would settle in the lake, but some may be discharged downstream. This accelerated rate of erosion and sedimentation will not affect the suitability of the water for water supply or recreation, but will diminish the aesthetics of the area.

Additionally, increasing normal water level at this project will not influence water quality in Stoughton Pond. North Springfield Dam's discharge water quality will not measurably alter present conditions downstream in the Black River.

e. Water Quality Conclusions. The water at North Springfield Lake is of good quality and is suitable for public water supply with standard treatment processes. No treatment would be required for the water to be acceptable for fire-fighting, irrigation, or some industrial processes. Raising the pool elevation by 3 feet to provide extra storage would increase levels of turbidity and erosion and sedimentation somewhat but would not significantly affect the suitability of the water for water supply or recreation.

10. DISCUSSION OF IMPACTS

a. General. Any action resulting in a temporary change of a reservoir's storage volume may have impacts on other project purposes which must be evaluated before a storage reallocation plan can be implemented. An evaluation has been made of the impacts resulting from drought contingency storage on the flood control purpose of this project. Effects on recreation, sedimentation and the aquatic and terrestrial environments as well as the historic and archaeological resources are also discussed in the following paragraphs. This study provides an overview of potential project impacts. Certain environmental concerns may require further consideration prior to project implementation.

b. Flood Control. A review of the regulation procedures at North Springfield Lake was undertaken to determine the volume of water that could be made available for drought contingency purposes. The water would be stored by temporarily utilizing existing flood control storage. It is recognized that major floods occur in every season of the year, thus any use of flood control storage would be continually monitored to insure that there would be no adverse impacts on downstream flood protection.

At North Springfield the maximum pool level for drought contingency storage would be at elevation 470 feet NGVD, a 3-foot increase in the present level of the summer recreation pool. This increase represents an infringement on the flood control storage of about 0.06 inch of runoff or one percent of the total flood storage capacity. This loss of storage is within acceptable limits established by the Corps of Engineers. Storage would most likely occur during late spring to early summer, with water being held at the 470 foot elevation for one month or more. The rate of drawdown will be determined by drought conditions and the needs of downstream water users.

c. Recreation. Recreational opportunities, primarily fishing, at North Springfield Lake, shyould not be affected by an increase in pool stage of 3 feet for the proposed drought contingency storage plan. The boat ramp at the Black River recreational area will still be functional, although some of the parking area may be inundated.

d. Project Operations. Additional operation and maintenance costs as well as possible restoration costs should shore line damage occur resulting from drought contingency storage, must be borne by the user. At North Springfield Lake gate regulation will be necessary to maintain a pool stage of 18 feet for drought contingency storage. The labor costs associated with this operation will be the responsibility of the user.

e. Effects on the Aquatic Ecosystem. The aquatic environment of the project area is located along the Black River, a tributary of the Connecticut River in eastern Vermont. A major tributary to the Black River is the North Branch, which joins the Black River within the project land area, about 2.5 miles upstream of North Springfield Dam. Stoughton Pond is a 65 acre subimpoundment created on the North Branch, wholely within the project fee-owned land. North Springfield Lake, the pool maintained behind the dam, has a year-round surface area of 100 acres and a water depth of approximately 15 feet during nonflood periods. The water surface is at elevation 467 feet NGVD.

Aquatic habitats within the reservoir can be divided into three primary areas: North Springfield Lake, Stoughton Pond, and the Black River with its tributary North Branch. The lake, with a maximum depth of only 15 feet, is suitable for warm water fisheries. In 1971, the Vermont Fish and Game Department stocked fingerling largemouth bass (Micropterus salmiodes) in North Springfield Lake. Subsequent sampling of the fish population has shown that the largemouth bass have successfully established in the lake.

Stoughton Pond, with a 20-foot deep permanent pool, is a marginal cold water fishery. The State of Vermont stocks the pond with rainbow trout (Salmo gairdneri) each year to maintain the population. Upstream of Stoughton Pond there is a self-sustaining population of brook trout (Salvelinus fontinalis) in the headwaters of the North Branch. This fishery has declined in recent years due to streambank erosion and resulting siltation. In the Black

River a self-sustaining brown trout (Salmo trutta) fishery exists immediately downstream of the old Perkinsville Dam. Several small streams entering the reservoir support small populations of brook trout. Downstream of North Springfield Dam the cool waters discharged from the bottom of the lake create favorable conditions for brown and rainbow trout. Trout fishing here is locally popular.

The proposal to raise the level of the pool up to 3 feet for drought storage will have no significant effect on the warm water fishery and no impact on upstream cold water fishery areas. During a drought emergency, any reduction of reservoir discharge below the established minimum flow of 15 cfs could impact downstream aquatic habitat. Further investigation of possible impacts would need to be part of any decision to pursue drought contingency storage at the project.

f. Effects on the Terrestrial Environment. North Springfield Lake is located three miles northwest of the city of Springfield, Vermont in southeastern Vermont. The regional topography is hilly to mountainous. Surrounding hills rise over 400 feet above the river. The highest point in the region is Mount Ascutney, elevation 3144 feet NGVD, located 7 miles north of the dam. The Black River valley in the vicinity of North Springfield Lake is approximately 1500 feet wide and framed by steep valley walls rising 100 feet or more above the river.

The region is predominately forest, consisting mostly of eastern hemlock (Tsuga canadensis), eastern white pine (Pinus strobus), American beech (Fagus grandifolia), yellow birch (Betula lutea), and sugar maple (Acer saccharum). Open farm land is found in the river valleys and other scattered areas of low relief. The river valley in the vicinity of North Springfield Lake was mainly agricultural land prior to construction of the dam. Most of this open land is now maintained by periodic mowing or is leased for agricultural use, primarily haying. Of the 1,372 acres owned in fee, approximately 425 are forest, 760 acres are open fields and 20 are marshland.

Floodwater storage has not had a significant impact on reservoir woodland as most of the area is open fields, and significant flood storage usually occurs during late winter and early spring when woody growth is still dormant. Reservoir clearing was initially limited to the area of the present Stoughton Pond. Following construction of the dam, a few acres of trees killed or heavily

damaged by impoundments or ice damage have been removed.

An increase in the level of North Springfield Lake of up to 3 feet for drought storage would inundate an additional 100 acres. The area which would be flooded is primarily open wet meadow, dominated by smartweed (Polygonum spp.). This area is presently subject to annual flood storage inundation. The prolonged flooding which may be required for drought storage will destroy most vegetation. Regrowth, which would not begin until the next growing season following drought storage, would initially be annual weeds. Long term vegetation impact would not be significant.

g. Effects on Wildlife. The principal wildlife spespecies inhabiting the woods and fields adjacent to North Springfield Lake include raccoon (Procyon lotor), woodchuck (Marmota monax), cottontail rabbit (Sylvalagus transitionalis), white tail deer (Odocoileus virginianus), black bear (Euarctos americanus), snowshoe hare (Lepus americanus), gray squirrel (Sciurus carolinensis), red squirrel (Tamiasciurus hudsonicus), ruffed grouse (Bonasa umbellus), woodcock (Philohela minor) and numerous songbird species. Aquatic species include muskrat (Ondatra zibethica), beaver (Castor canadensis), occasional otter (Lutra canadensis) and mink (Mustela vison), and migrating waterfowl. Duck nesting boxes placed in the reservoir have shown evidence of use by wood ducks (Aix sponsa).

Raising the pool level by 3 feet would have no significant impact on upland wildlife habitat as this area is inundated at least once each year for several days during flood operation. Increasing the pool level would inundate an area of up to 55 acres of wetland habitat north and west of the present conservation pool. This wetland habitat is annually used by approximately 20 broods of mallards, black ducks, wood ducks and teal, for breeding and feeding. These wetlands also contain approximtely 5 beaver lodges and 50 muskrat lodges and bank dens. When this wetland habitat is flooded for the entire season with 3 feet of water, migratory waterfowl will avoid the area, a few will attempt to nest in marginal areas or not nest at all. Beaver and muskrat breeding facilities will be abandoned and reproduction substantially reduced. Waterfowl and furbearer food will be seriously limited and those food sources which survive the flooding will be heavily used and possibly damaged.

h. Historical and Archaeological Resources. An archaeological survey at North Springfield Lake identi-

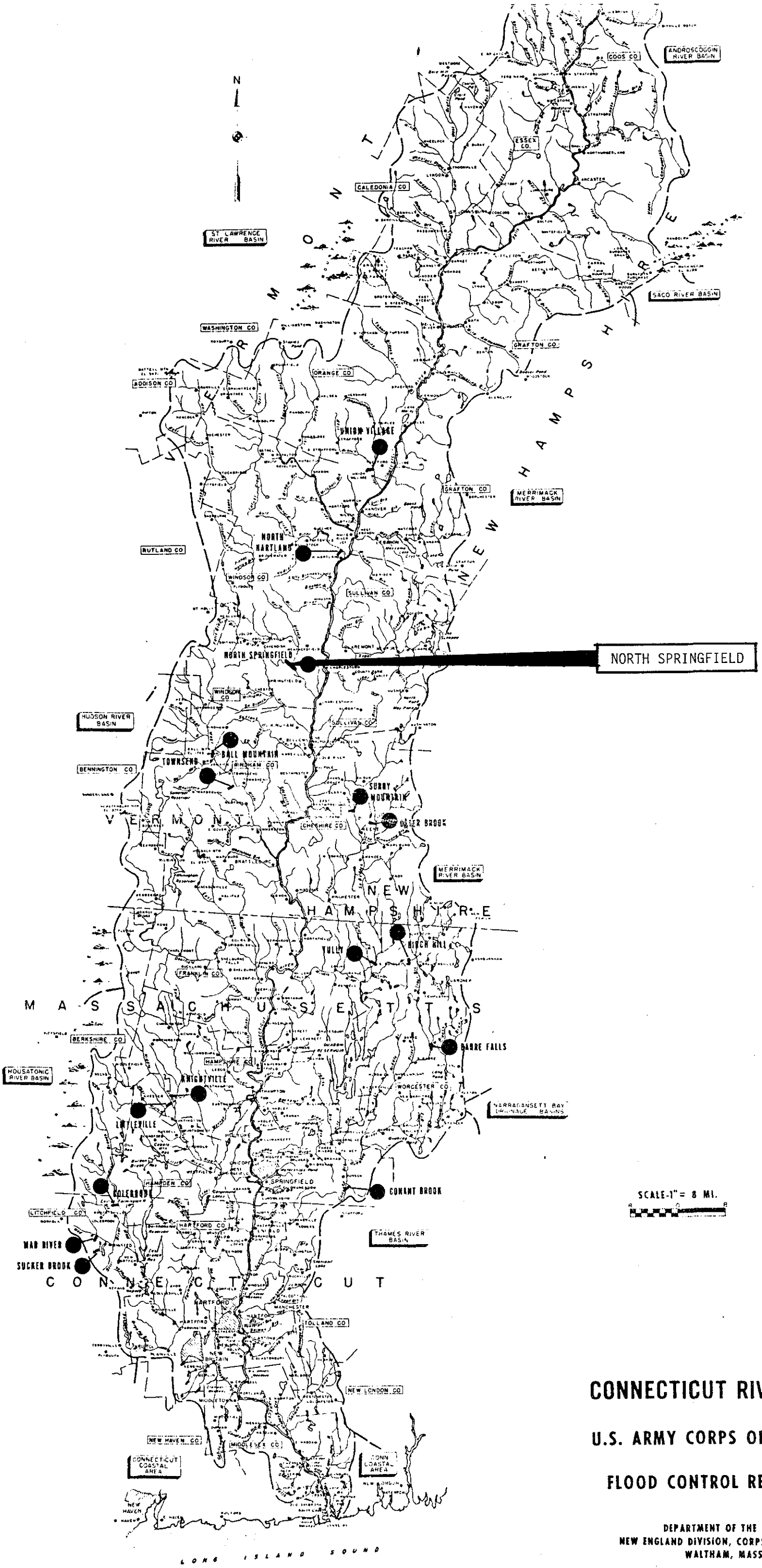
fied several zones of high potential for prehistoric archaeological sites around the perimeter of the permanent pool. A drought contingency pool at 470 feet NGVD could have an erosional impact on any such site within the inundated zone.

In order to comply with the requirements of the National Preservation Act, an archaeological reconnaissance survey should be a part of any decision to pursue drought contingency storage at the project.

11. SUMMARY AND CONCLUSIONS

It has been determined that a portion of the existing storage at North Springfield Lake could be utilized for emergency drought purposes without having an adverse impact on the project's flood control functions. The water could be temporarily stored to an elevation of 470 feet NGVD. At this level, 3 feet above the permanent pool, it would be possible for the project to provide up to approximately 1,060 acre-feet (345 million gallons) of reservoir storage for drought emergency purposes. A cursory evaluation of the potential effects of this plan has revealed no significant adverse impacts to the project or the environment. A review for compliance with all current environmental laws would be required at the time of any decision to pursue drought contingency storage at the project.

The water at North Springfield Lake is of good quality and is suitable for public water supply with standard treatment processes. No treatment would be required for the water to be acceptable for firefighting, irrigation or some industrial processes. Raising the pool elevation by 3 feet to provide drought contingency storage would increase levels of turbidity, erosion and sedimentation somewhat but would not significantly affect the suitability of the water for water supply or recreation.



CONNECTICUT RIVER BASIN

U.S. ARMY CORPS OF ENGINEERS

FLOOD CONTROL RESERVOIRS

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

JANUARY 1981

PLATE 1

NORTH SPRINGFIELD RESERVOIR
AREA AND CAPACITY
(DA = 158 square miles)

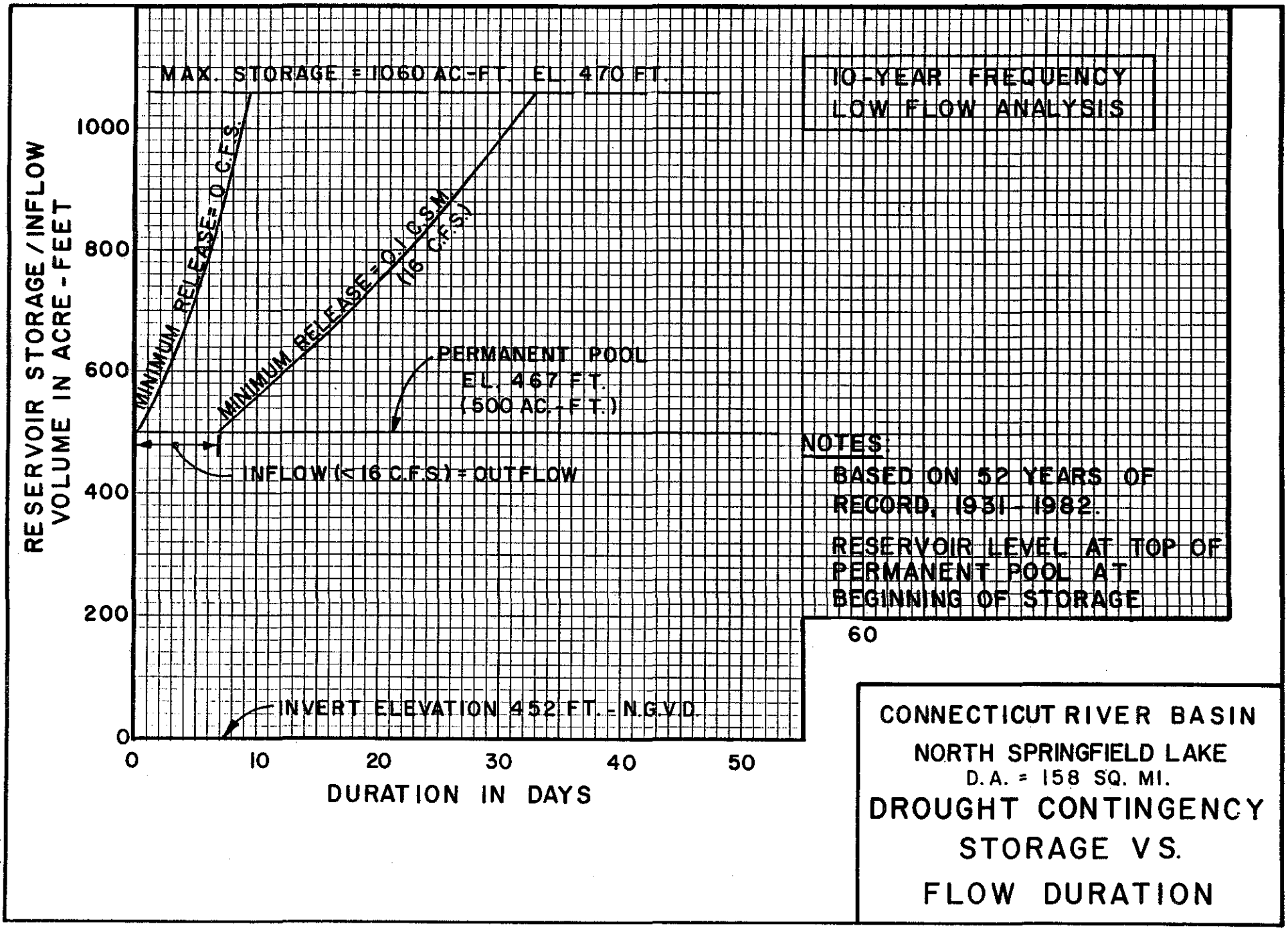
Elevation (msl)	Stage (ft)	Area (acres)	Capacity Ac/Ft	Capacity Inches
452	0	Gate Invert Elevation		
467	15	100	500	0.06
467	15	100	0	0.0
475	23	290	1,500	0.18
477	25	325	2,000	0.24
479	27	360	2,650	0.31
481	29	380	3,400	0.40
483	31	400	4,000	0.47
485	33	420	4,800	0.57
487	35	440	5,600	0.66
489	37	455	6,400	0.76
491	39	470	7,200	0.85
493	41	480	8,000	0.95
495	43	495	8,900	1.06
497	45	510	9,600	1.14
499	47	530	10,600	1.26
501	49	550	11,700	1.39
503	51	570	12,750	1.51
505	53	595	14,000	1.66
507	55	620	15,000	1.78
509	57	650	16,500	1.96
511	59	675	17,700	2.10
513	61	695	19,200	2.28
515	63	720	20,700	2.46
517	65	745	22,300	2.65
519	67	770	24,000	2.85
521	69	795	25,600	3.04
523	71	820	27,200	3.23
525	73	850	29,000	3.44
527	75	880	30,600	3.63
529	77	910	32,500	3.86
531	79	945	34,500	4.09
533	81	980	36,100	4.28
535	83	1,020	38,100	4.52
537	85	1,060	40,100	4.76
539	87	1,095	42,100	5.00
541	89	1,125	44,200	5.25
543	91	1,160	46,200	5.48
545.5	93.5	1,200	50,000	5.93
547	95	1,220	51,200	6.08
549	97	1,250	54,000	6.41
551	99	1,280	57,000	6.77

1-inch runoff = 8,425 acre-feet
Permanent Pool Elevation = 467
Spillway Crest Elevation = 545.5

PERTINENT DATA
NORTH SPRINGFIELD DAM AND RESERVOIR

LOCATION	Black River, Springfield, Vermont			
DRAINAGE AREA	158 square miles			
RESERVOIR STORAGES				
	Permanent Pool	Recreation Pool Areas		Flood Control Pool
		Black River	North Branch	
Full pool elevation (ft,msl)	467	467	502	545.5
Capacity - acre-feet (net)	500	500	600	48,500 to 50,000
- inches (net)	0.06	0.06	0.07	5.75 to 5.93
Full pool area (acres)	100	100	65	1,200

EMBANKMENT FEATURES		
	Main Dam	Relocated Town Road 22 (North Branch)
Type	Rolled earth and rockfill	Rolled earth and rock fill
Length (ft)	2,940	900
Top elevation (ft,msl)	570	552
Maximum height	120	75
Top width	30	28
Slopes	1 on 2 to 1 on 4	1 on $2\frac{1}{4}$ to 1 on $2\frac{1}{2}$
SPILLWAY FEATURES		
Type	Conventional side channel with ogee weir	Broad Crested (Town Road 22 roadway)
Length (ft)	384	200
Crest elevation (ft,msl)	545.5	550
SPILLWAY DESIGN FLOOD		
Inflow (cfs)	157,000	8,200 (project design flood)
Total outflow	125,500	2,440
spillway	117,200	1,600
conduit	8,300	840
Maximum surcharge (ft,msl)	564.8	551.5
feet above crest	19.3	1.5
OUTLET WORKS		
Type	Horseshoe conduit	Cir. corrugated metal
Size (ft, diameter)	12.75	8
Length (ft)	659	300
Invert elevation (ft,msl)	452	497
Capacity at spillway crest (cfs)	11,900	1,800
Gate type	Three 5'x12' slide	-
LAND ACQUISITION		
Fee taking elevation (ft,msl)	520	
Flowage easement	550	
PROJECT COST	$6,654,000 (dam and appurtenant facilities)	
PLACED IN OPERATION	September 1960	
MAINTAINED BY	New England Division	



CONNECTICUT RIVER BASIN

NORTH SPRINGFIELD LAKE

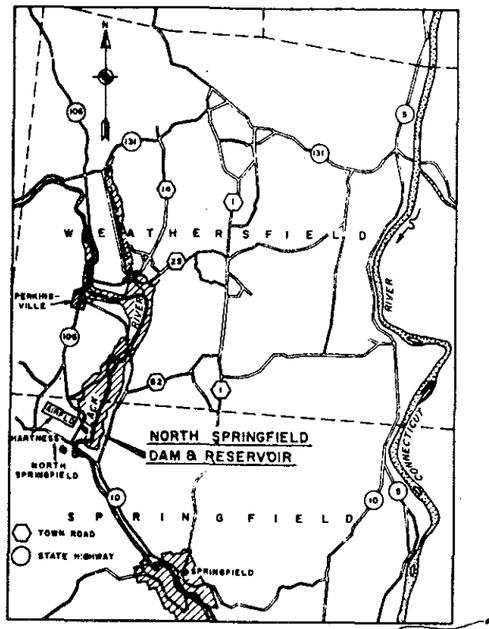
D.A. = 158 SQ. MI.

DROUGHT CONTINGENCY STORAGE VS. FLOW DURATION

PLATE 4

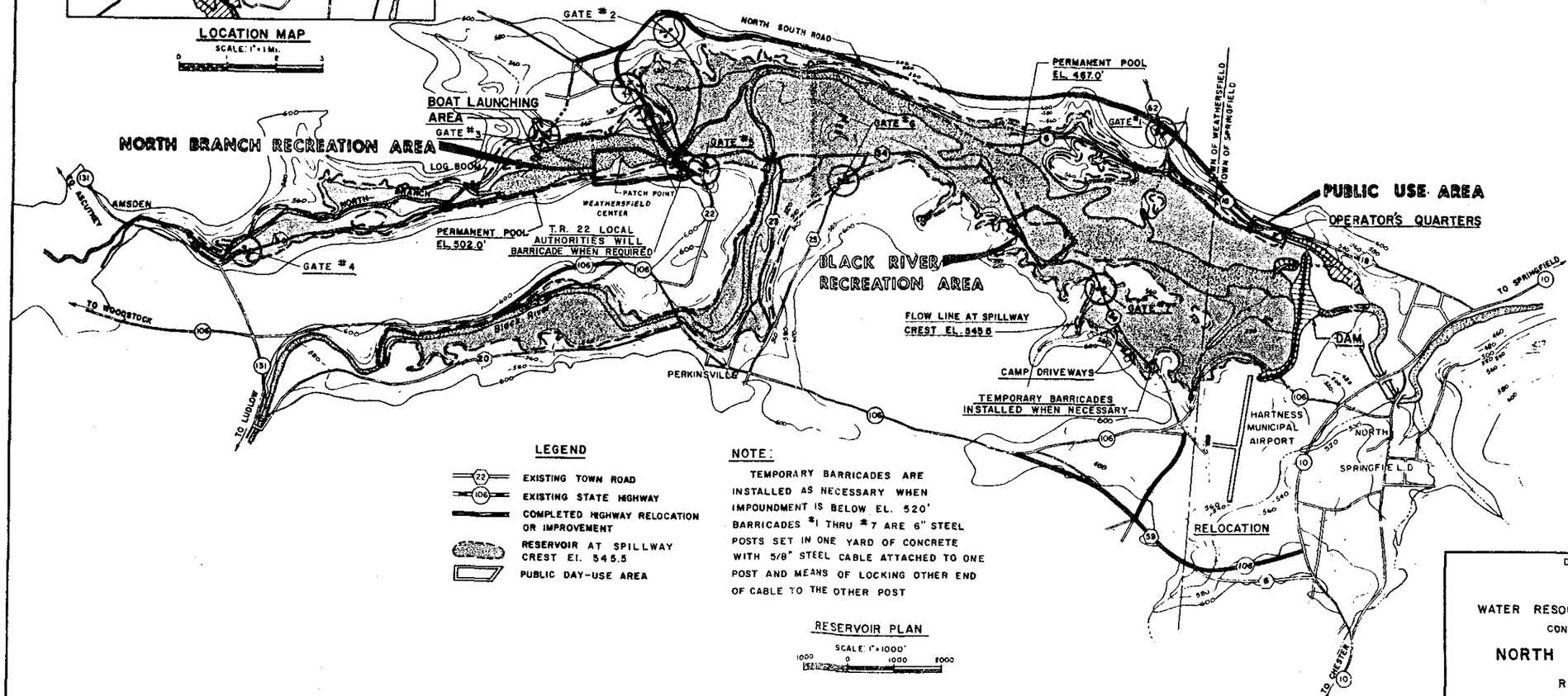
CORPS OF ENGINEERS

U. S. ARMY



LOCATION MAP

SCALE: 1" = 1 Mi.



LEGEND

- EXISTING TOWN ROAD
- EXISTING STATE HIGHWAY
- COMPLETED HIGHWAY RELOCATION OR IMPROVEMENT
- RESERVOIR AT SPILLWAY CREST EL. 545.5
- PUBLIC DAY-USE AREA

NOTE:

TEMPORARY BARRICADES ARE INSTALLED AS NECESSARY WHEN IMPOUNDMENT IS BELOW EL. 520' BARRICADES #1 THRU #7 ARE 6" STEEL POSTS SET IN ONE YARD OF CONCRETE WITH 5/8" STEEL CABLE ATTACHED TO ONE POST AND MEANS OF LOCKING OTHER END OF CABLE TO THE OTHER POST

RESERVOIR PLAN

SCALE: 1" = 1000'

1000 0 1000 2000

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.

WATER RESOURCES DEVELOPMENT PROJECT

CONNECTICUT RIVER BASIN

NORTH SPRINGFIELD LAKE

RESERVOIR MAP

BLACK RIVER VERMONT

PLATE 5